



## REMUR Material Data Sheet CM-PC-2.3

## FAST SETTING PATCHING MATERIALS: REGULATED-SET PORTLAND CEMENT

## 1. NAME

Regulated-Set Portland Cement

## 2. MANUFACTURER

Ideal Basic Industries  
P.O. Box 99  
Saratoga, AR 71859  
Telephone: 1-800-874-5756

## 3. DESCRIPTION

Regulated-Set Portland Cement (RSPC) is a portland cement modified with a new ternary compound calcium fluoro-aluminate in place of the tricalcium aluminate found in normal portland cement to produce very high early strengths and short set times.

## 4. USES &amp; LIMITATIONS

Uses: Used in making concrete for rapid repairs of portland cement concrete pavements, floors, and structural members when high early strength is needed.

Limitations: Concrete made with RSPC shows significantly greater expansion and weight loss during storage in sulfate solution than concrete made with a Type I portland cement. Its use in concrete exposed to sulfate soils or water is not recommended.

## 5. MANUFACTURER'S TECHNICAL DATA

Handling time:

The manufacturer states that the handling time of regulated-set portland cement is approximately 20 min at 73°F. Citric acid can be used as a retarder to extend the handling time by as much as an hour. Early strengths will be adversely affected by retarder usage. A dosage rate of 0.2-percent citric acid by weight of cement will increase the handling time approximately twofold at 73°F. The handling time for different dosage rates of citric acid at 90°F is given below:

Dosage Rate Citric Acid % weight of cement	Handling Time minutes
0.2	15
0.3	29
0.4	44
0.5	64

Freeze-thaw durability:

The manufacturer states that an adequate level of freeze-thaw durability can be achieved by the use of air-entraining admixtures in the same manner as for other cements. The manufacturer reported a durability factor of 87 percent for a concrete containing 7 bags per cubic yard cement, having a water-to-cement ratio of 0.40 and an air content of 7.0 percent when tested according to ASTM C 666-84, Procedure A. The scaling resistance of concrete surfaces exposed to deicing chemicals (4-percent calcium chloride) was tested according

to ASTM C 672-84 for 25 cycles. Two concrete mixtures were tested, and the mixture proportions are given below:

<u>Mixture</u>	<u>No. 1</u>	<u>No. 2</u>
Cement	658 lb	846 lb
Gravel, 3/4 in.	1,650 lb	1,480 lb
Sand	1,144 lb	1,020 lb
Water	329 lb	381 lb
Air	5 percent	5 percent

Mixture No. 1 had a rating of 2 and Mixture No. 2 had a rating of 1 after testing.

#### Compressive strengths:

A report from the Arkansas Highway and Transportation Department was included in the information obtained from the manufacturer and reported compressive strengths given below:

<u>Age</u>	<u>Compressive Strength, psi</u>
3 hr	2,510
6 hr	2,990
1 day	4,010
7 days	5,500
28 days	6,340

The concrete mixture was proportioned as given below:

752 lb	Ideal Regulated-Set Portland Cement
1,120 lb	Sand
1,680 lb	Rock--3/4-in. crushed granite No. 67
280 lb	Water
8 oz	Air-entraining admixture
24 oz	High range water reducer

#### 6. MANUFACTURER'S GUIDANCE FOR APPLICATION

Mixture proportions and mixing: The manufacturer states that the concrete mixture proportions should be the same as those used for portland cement concrete patching using a 7 to 8 bag (94 lb) RSPC mixture. The mixing

water should be adjusted to obtain a slump of 4 to 5 in. The manufacturer can supply the retarder which is packaged in small plastic bags for both 50- and 94-lb bags of the RSPC. One of the small bags of retarder will reduce the setting time of the concrete mixture 10 min at 70°F.

To obtain optimum performance from RSPC, a continuous mixer is recommended but very good performance can be obtained with almost any type of batch mixer. When a batch mixer is used, the manufacturer recommends the following batching procedure:

1. First add the coarse aggregates and about 3/4 of the water together.
2. If necessary, add the amount of citric acid needed to give the desired set retardation.
3. Add the regulated-set portland cement as rapidly as possible.
4. Add an air-entraining agent if desired and the remainder of water.
5. Add the fine aggregate.
6. Mix for 2 but not more than 3 min.

Placement and finishing. RSPC concrete is placed and finished the same way as conventional concrete, except that the concrete should be placed within 15 min after addition of the mixing water and finished immediately after placement. The manufacturer recommends that a curing compound be applied to the finished surface immediately.

#### 7. CORPS OF ENGINEERS' EVALUATION

<u>Properties</u>	<u>Test Method</u>	<u>Results</u>
Compressive strength, psi	ASTM C 109	
2 hr		2,960

<u>Properties</u>	<u>Test Method</u>	<u>Results</u>
4 hr	ASTM C 39	3,860
6 hr		4,230
1 day* <sup>-1</sup>		4,160
1 day		5,670
7 days		6,630
28 days		7,650
Flexural strength, psi	ASTM C 78	
1 day		800
28 days		890
Bond to concrete, psi	ASTM C 882	>3,900
Scaling resistance to deicing chemicals, 25 cycles	ASTM C 672	slight scaling rating of 1

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\*<sup>-1</sup> Materials and mold conditioned at 40°F before preparing test specimens and stored at 40°F till tested.

## 8. ENVIRONMENTAL CONSIDERATIONS

Reasonable caution should guide the preparation, repair, and cleanup phases of activities involving potentially hazardous and toxic chemical substances. Manufacturer's recommendations to protect occupational health and environmental quality should be carefully followed. Material safety data sheets must be obtained from the manufacturers of such materials. In cases where the effects of a chemical substance on occupational health or environmental quality are unknown, chemical substances should be treated as potentially hazardous toxic materials.

## 9. AVAILABILITY & COST

This cement is marketed throughout the United States. RSPC is prepackaged in 94- and 50-lb bags. The cost of the cement is \$6.00 per 50-lb bag and \$9.50 per 94-lb bag and \$160 per ton bulk delivery (prices FOB, 1990).